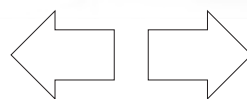
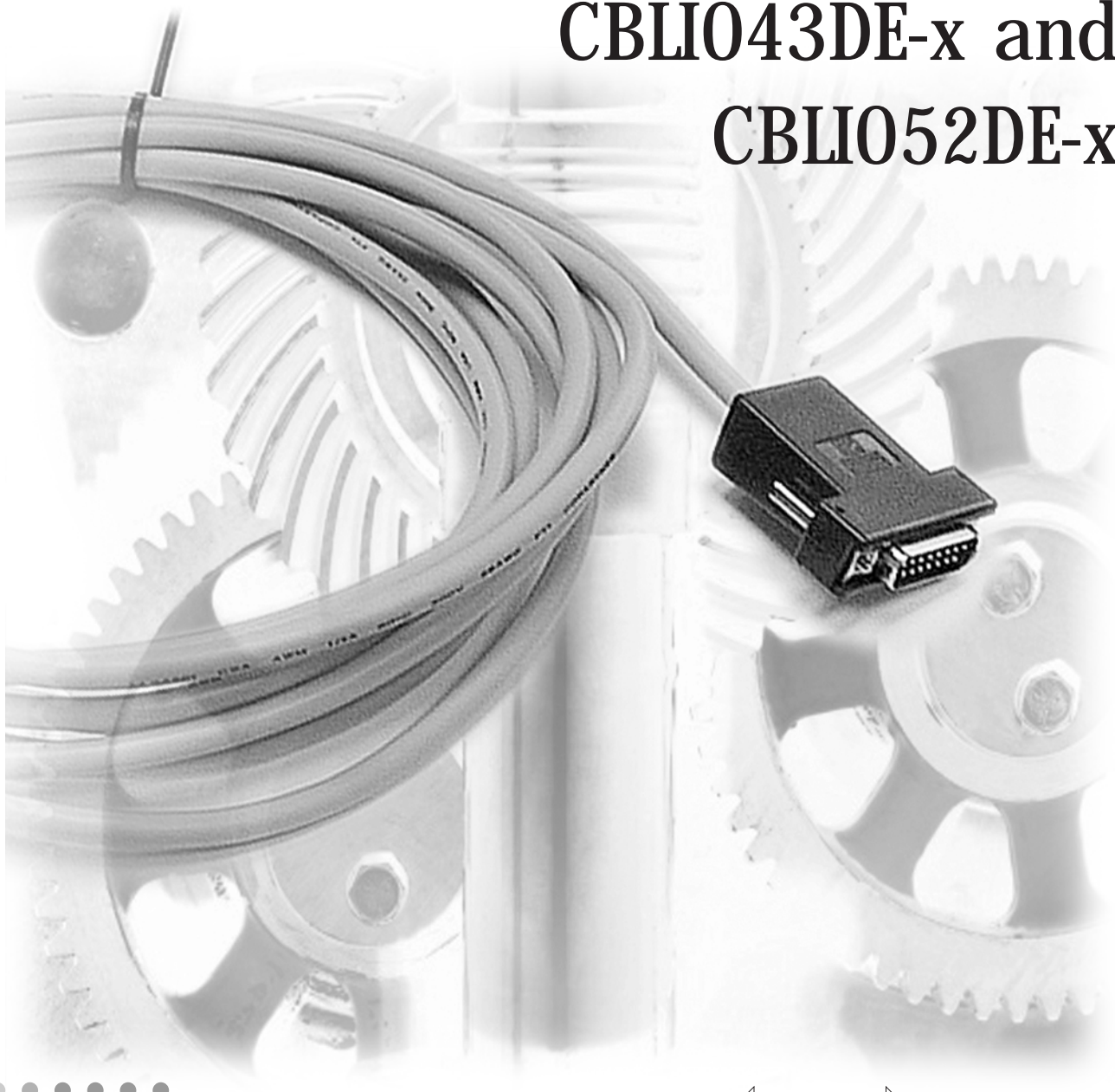


# CBLI043-x, CBLI052-x, CBLI043DE-x and CBLI052DE-x



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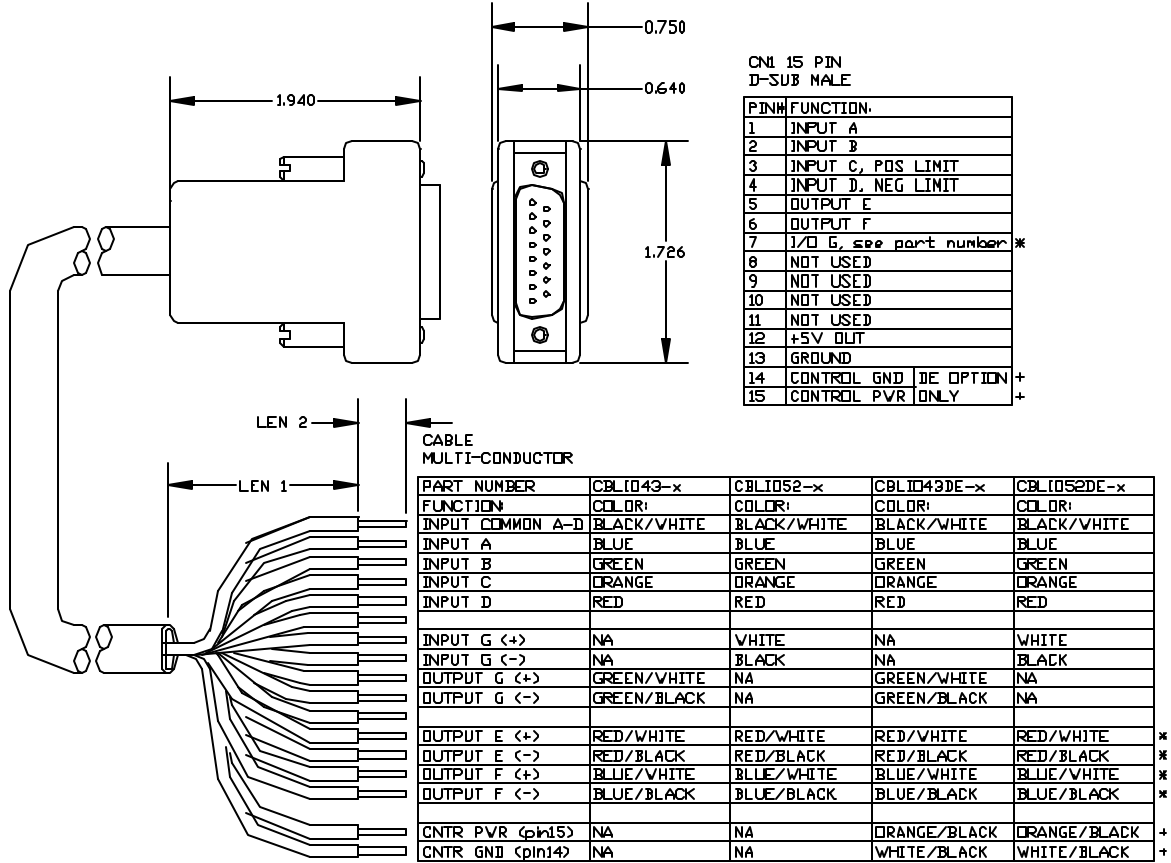
Defining the Future in Motion Control

**USER'S GUIDE**

# CBLIO43-x, CBLIO52-x, CBLIO43DE-x, and CBLIO52DE-x USER'S MANUAL

## Overview

The CBLIO43-x<sup>1</sup>, CBLIO52-x<sup>1</sup>, CBLIO43DE-x<sup>1</sup>, and CBLIO52DE-x<sup>1</sup> are cables with a DB15 connector that converts 5VDC SmartMotor I/O to 24VDC I/O. The user will specify on the part number for cable with either four digital inputs and three digital outputs (CBLIO43-x) or five digital inputs and two outputs (CBLIO52) with or without DE option. The DE option brings 24Vdc or 48Vdc to the SmartMotor's control for SmartMotor with the DE option. The DE option on the cable and on the motor will allow the user to take away power to the motor but keep power to the controller alive. This cable connects directly into the SmartMotor's DB 15 I/O connector (CN2) on the SM23xxD and SM34xxD series.



ALL I/Os ARE DIODE PROTECTED, ISOLATED AND 24 VOLT OUTPUTS SINK OR SOURCE AS MUCH AS 100mA EACH.

TYPICAL OUTPUT CONNECTION PUTS COMMON TO GROUND, THE OUTPUT TO ONE LEG OF THE DEVICE WITH THE OTHER LEG TO 24 VOLTS. SOURCING WORKS TOO.

INPUT COMMON CAN BE CONNECTED TO +24V OR GND. INPUTS ARE TRIGGERED WITH PLUS OR MINUS 24V BETWEEN THEM AND THE INPUT COMMON.

\*PORT G IS ONLY USED AS INPUT FOR CABLE WITH PART NUMBER CBLIO52-x OR CBLIO52DE-x

\*PORT G IS ONLY USED AS OUTPUT FOR CABLE WITH PART NUMBER CBLIO43-x OR CBLIO43DE-x

INPUT CANNOT BE USED IF IT EXCEEDS 30 VOLTS 8mA.

OUTPUT CANNOT BE USED IF IT EXCEEDS 30 VOLTS 100mA.

+TO BE USED WITH DE OPTION SMARTMOTORS FOR KEEPING CONTROLLER ALIVE DURING E-STOP. INPUT VOLTAGE RANGES FROM 24Vdc to 48Vdc, DO NOT EXCEED 48Vdc. (CBLIO43DE-x AND CBLIO52DE-x)

PART NUMBER	x	LEN 1	LEN 2
CBLIO43-5M			
CBLIO52-5M	5m		
CBLIO43DE-5M	(16.4 ft)	3 in	0.5 in
CBLIO52DE-5M			
CBLIO43-10M	10m		
CBLIO52-10M	(32.8 ft)		
CBLIO43DE-10M			
CBLIO52DE-10M			

MULTI-CONDUCTOR  
HOOD COLOR: BLACK  
JACKET COLOR: GRAY  
CONDUCTOR : 20-26 AWG

<sup>1</sup> 5M for x for 5m (16.4 ft) length

10M for x for 10m (32.8 ft) length

Inputs A to D can be set to either all sourcing or sinking inputs. Port G input is independent from input A to D. Outputs E, F, and G are wired independently so they can either be sourcing or sinking.

**RATING:**

**Input**

min. voltage	24 VDC
max. voltage	30 VDC
min. current	5 mA
max. current	8 mA

**Output**

max. voltage	30 Vdc
max. current	100 mA

Damage may occur if these maximum ratings are exceeded.

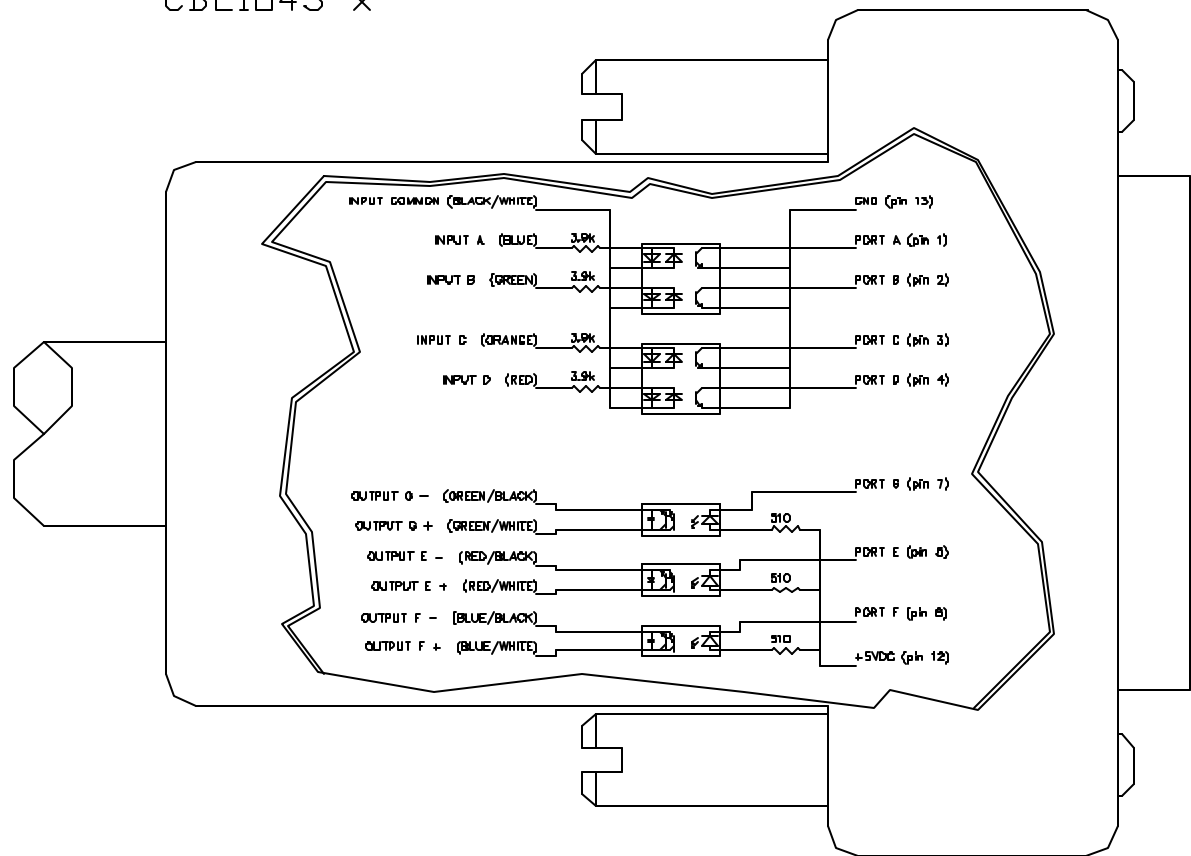
**SmartMotor Interface**

The CBLIO43-x, CBLIO52-x, CBLIO43DE-x, and CBLIO52DE-x cable use the following I/O pins on the SmartMotor as listed:

PIN	SIGNAL	DESCRIPTION
1	input A	Digital input A / Encoder input A / Step input (input frequency 50kHz)
2	input B	Digital input B / Encoder input B / direction input (input frequency 50kHz)
3	input C	Digital input C / Positive Limit
4	input D	Digital input D / Negative Limit
5	output E	Digital output E
6	output F	Digital output F
7	input/output G	Digital input G ONLY for CBLIO52-x and CBLIO52DE-x Digital output G ONLY for CBLIO43-x and CBLIO43DE-x
12	+5Vdc	+5Vdc output
13	GND	Signal Ground
14	GND	for SmartMotor with DE option, Control GND
15	PWR	for SmartMotor with DE option, Control POWER

CBLIO43-x Schematic

CBLIO43-x

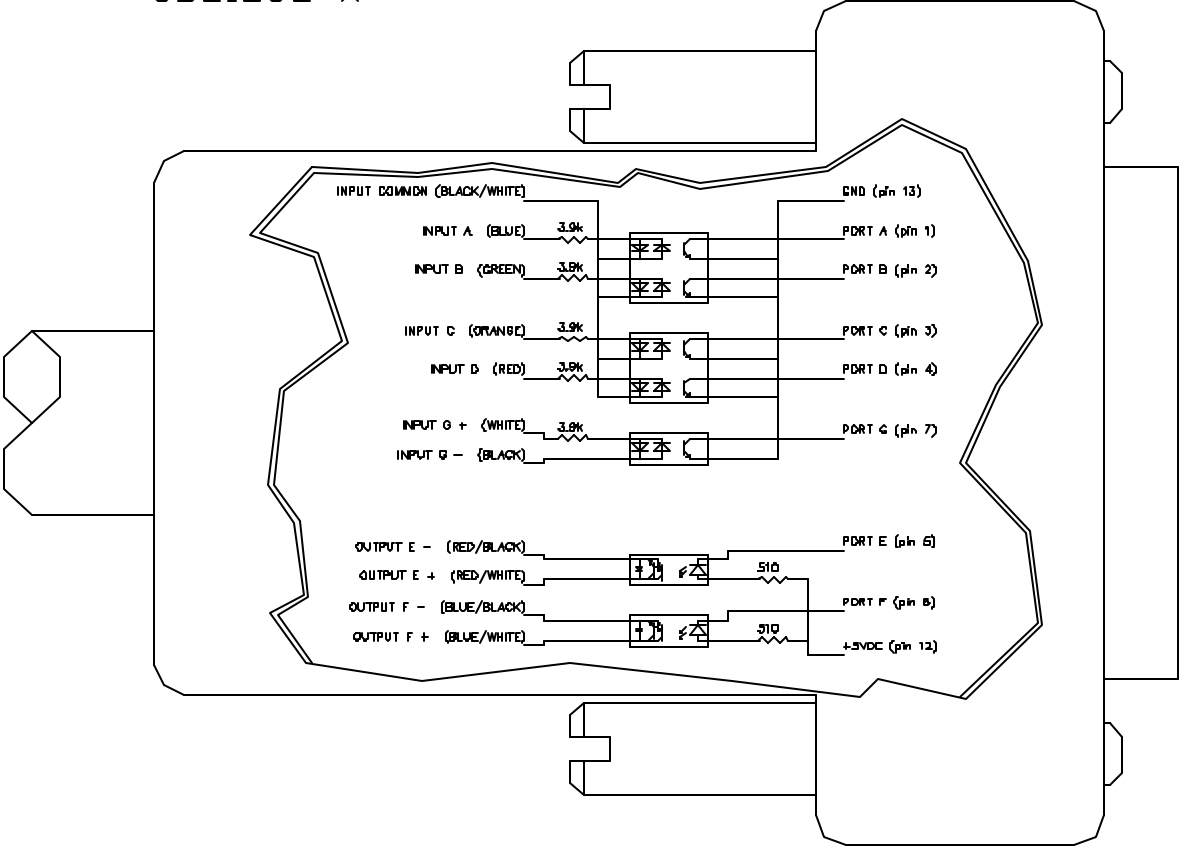


CABLE  
MULTI-CONDUCTOR

PART NUMBER	CBLIO43-x
FUNCTION:	COLOR:
INPUT COMMON A-D	BLACK/WHITE
INPUT A	BLUE
INPUT B	GREEN
INPUT C	ORANGE
INPUT D	RED
INPUT G (+)	NA
INPUT G (-)	NA
OUTPUT G (+)	GREEN/WHITE
OUTPUT G (-)	GREEN/BLACK
OUTPUT E (+)	RED/WHITE
OUTPUT E (-)	RED/BLACK
OUTPUT F (+)	BLUE/WHITE
OUTPUT F (-)	BLUE/BLACK
CNTR PWR (pin15)	NA
CNTR GND (pin14)	NA

CBLIO52-x Schematic

CBLIO52-x

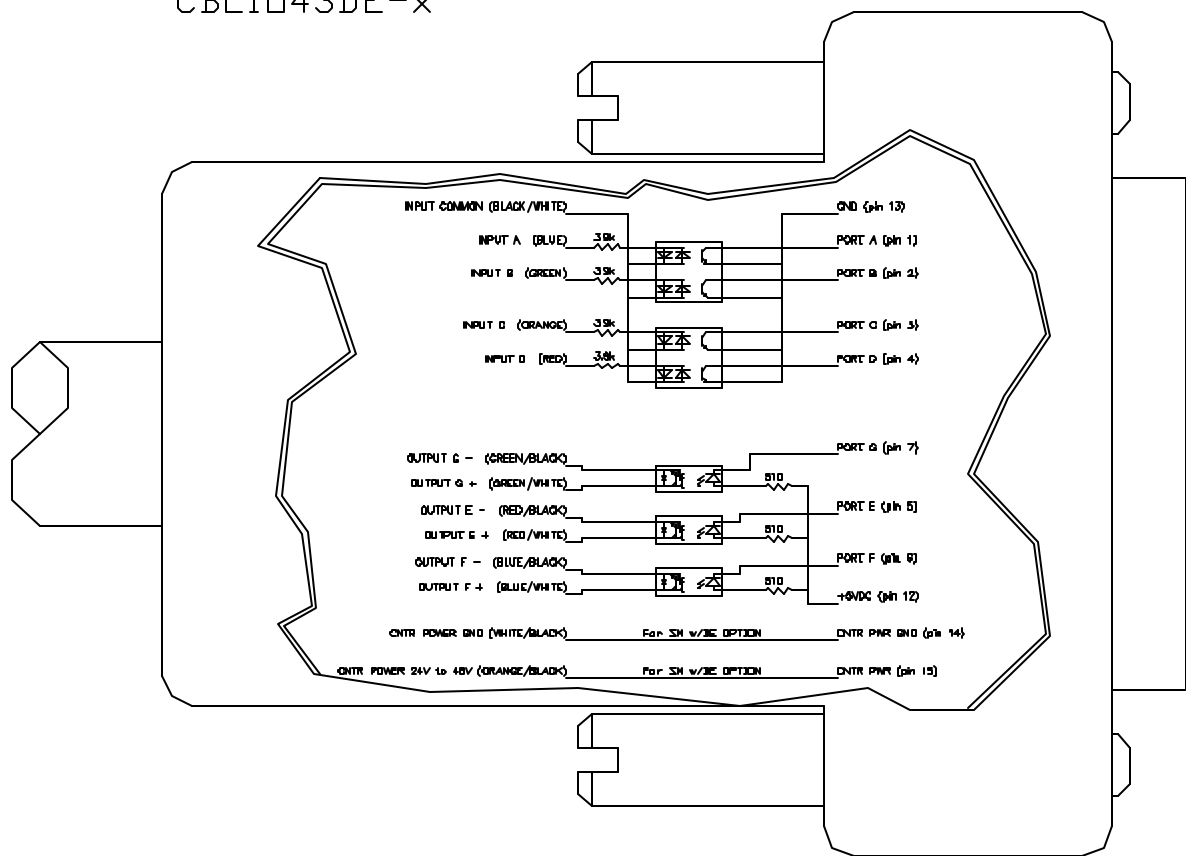


CABLE  
MULTI-CONDUCTOR

PART NUMBER	CBLIO52-x
FUNCTION:	COLOR:
INPUT COMMON A-D	BLACK/WHITE
INPUT A	BLUE
INPUT B	GREEN
INPUT C	ORANGE
INPUT D	RED
INPUT G (+)	WHITE
INPUT G (-)	BLACK
OUTPUT G (+)	NA
OUTPUT G (-)	NA
OUTPUT E (+)	RED/WHITE
OUTPUT E (-)	RED/BLACK
OUTPUT F (+)	BLUE/WHITE
OUTPUT F (-)	BLUE/BLACK
CNTR PWR (pin15)	NA
CNTR GND (pin14)	NA

CBLIO43DE-x Schematic

CBLIO43DE-x

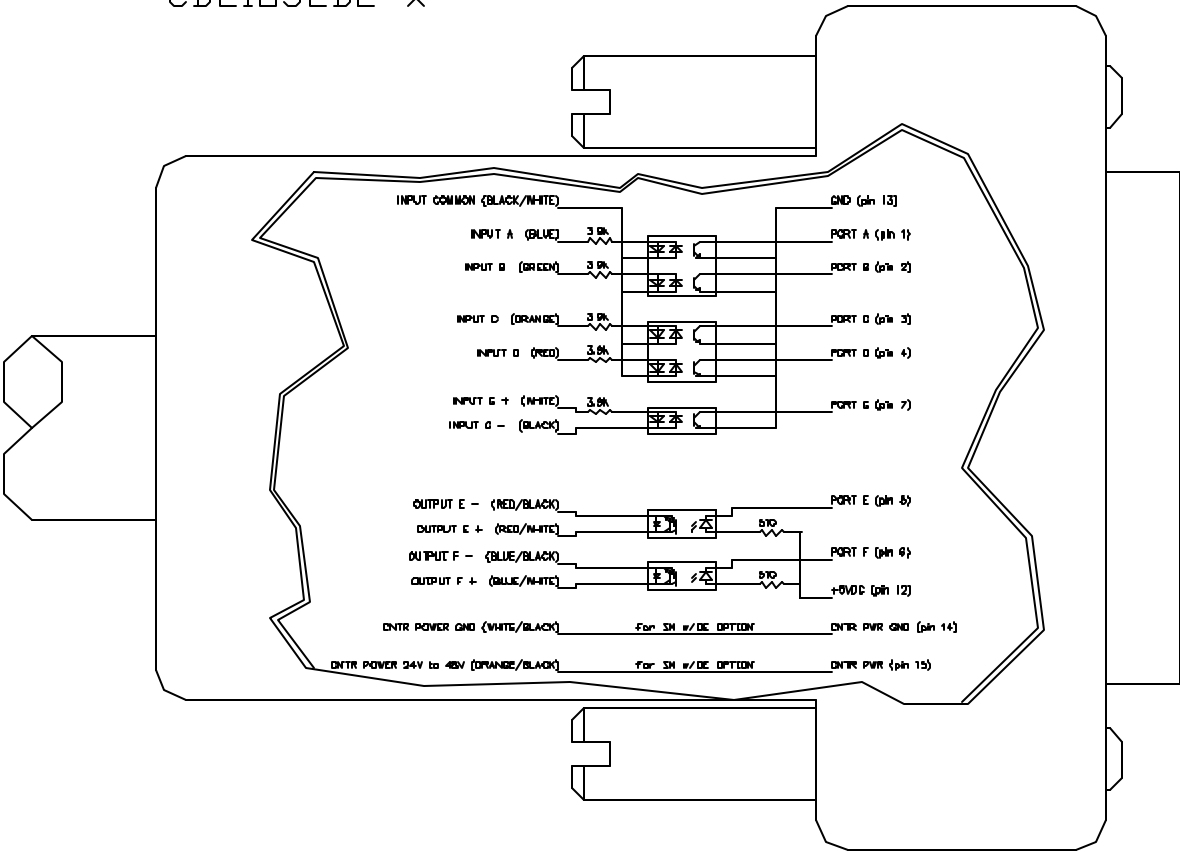


CABLE  
MULTI-CONDUCTOR

PART NUMBER	CBLIO43DE-x
FUNCTION:	COLOR:
INPUT COMMON A-D	BLACK/WHITE
INPUT A	BLUE
INPUT B	GREEN
INPUT C	ORANGE
INPUT D	RED
INPUT G (+)	NA
INPUT G (-)	NA
OUTPUT G (+)	GREEN/WHITE
OUTPUT G (-)	GREEN/BLACK
OUTPUT E (+)	RED/WHITE
OUTPUT E (-)	RED/BLACK
OUTPUT F (+)	BLUE/WHITE
OUTPUT F (-)	BLUE/BLACK
CNTR PWR (pin15)	ORANGE/BLACK
CNTR GND (pin14)	WHITE/BLACK

CBLIO52DE-x Schematic

CBLIO52DE-x



CABLE  
MULTI-CONDUCTOR

PART NUMBER	CBLIO52DE-x
FUNCTION:	COLOR:
INPUT COMMON A-D	BLACK/WHITE
INPUT A	BLUE
INPUT B	GREEN
INPUT C	ORANGE
INPUT D	RED
INPUT E (+)	WHITE
INPUT E (-)	BLACK
OUTPUT E (+)	NA
OUTPUT E (-)	NA
OUTPUT F (+)	RED/WHITE
OUTPUT F (-)	RED/BLACK
OUTPUT G (+)	BLUE/WHITE
OUTPUT G (-)	BLUE/BLACK
CNTR PWR (pin15)	ORANGE/BLACK
CNTR GND (pin14)	WHITE/BLACK

### **DE Control Power Input Rating**

#### **Input**

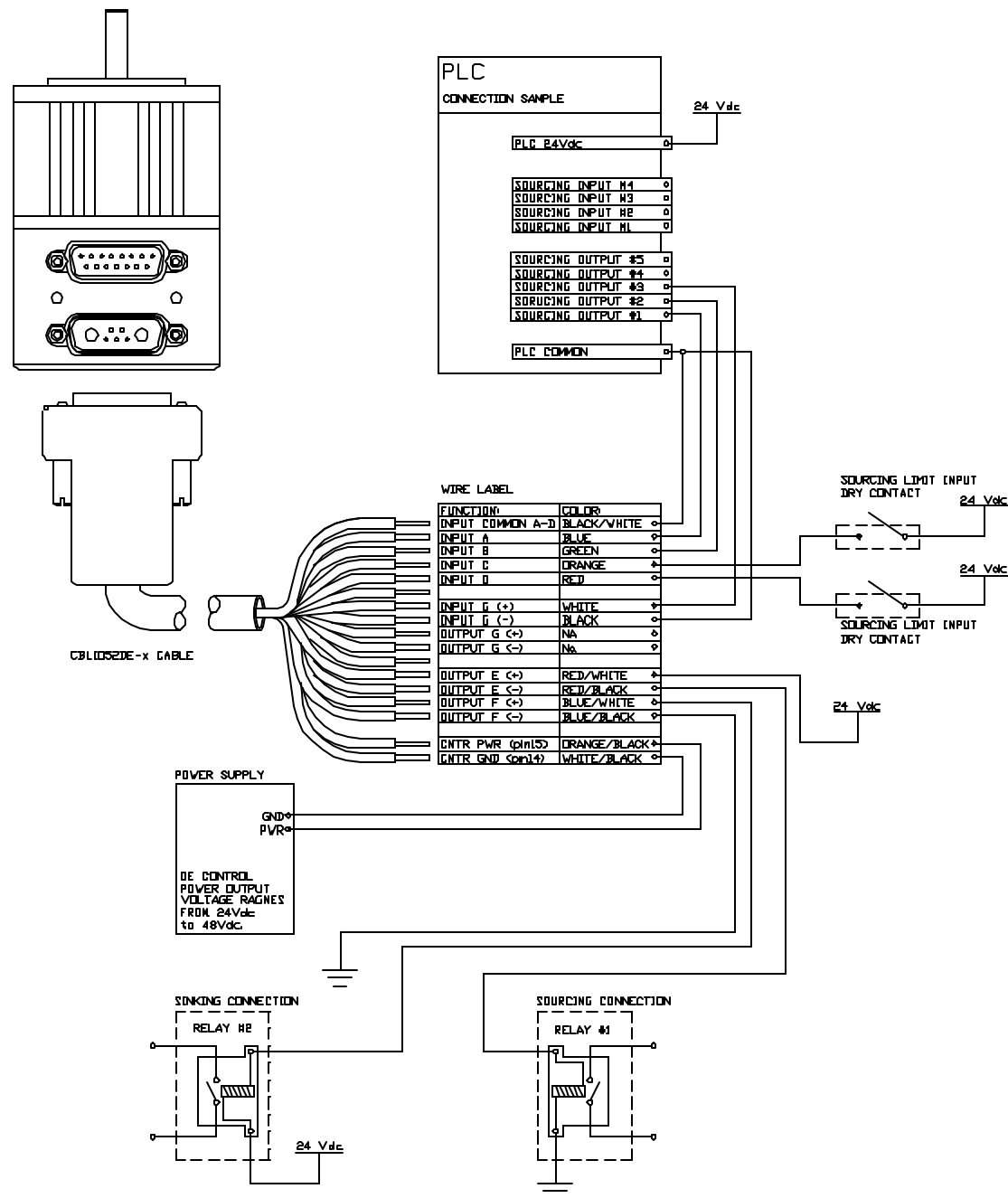
min. voltage	24VDC
max. voltage	48VDC
min. current	60mA
max. current	100mA

Damage may occur if these maximum ratings are exceeded.



Application

The CBLIO52DE cable is used to interface the SmartMotor with a PLC and some coil relay. A sample application wiring with program is shown below:



The above diagram is an example of using the CBLIO52DE-x cable to interface the SmartMotor with a PLC. The sample program below reads output signal from the PLC to determine which predefined profile to run. After a move completed, the SmartMotor will signal back to the PLC. Also, the SmartMotor™ will send outputs to the SmartMotor if an error occurred.

```
'SAMPLE PROGRAM USING I/O
'INPUT A to C for PLC profile selection
'INPUT D for read ready
'OUTPUT G motor signal PLC after motion completed
'OUTPUT E and F to turn on/off pump and value
'
'initialize I/O ports
UAI      'initialize port A as input, signal input bit 0
UBI      'initialize port B as input, signal input bit 1
UCP      'initialize port C as RT Limit input
UDM      'initialize port D as LT Limit input
UE=1     'set output E off
UEO      'initialize port E as output, trajectory start(high)/ended(low)
UF=1     'set output F off
UFO      'initialize port F as output, fault(high)
UGI      'initialize port G as input, read ready trigger

'set Acceleration/velocity
MP        'set motor to ModePosition
A=8*100   'set acceleration to 100 rps^2 for motors with 500 line encoder
V=32212*30 'set velocity to 30 rps for motors with 500 line encoder

'read/check input loop
WHILE 1
    WHILE UGI==1 LOOP
        UF=1
        ab[0]=UAI
        ab[1]=UBI*2
        a=ab[0]+ab[1]
        SWITCH a
            CASE 0
                PRINT("CASE 0 move to P=8000",#13)
                P=8000
                GOSUB0
                'set position value
                'GO to SUBroutine C0 to start motion and
                ' error handling
            BREAK
            CASE 1
                PRINT("CASE 1 move to P=10000",#13)
                P=10000
                GOSUB0
                'set position value
                'GO to SUBroutine C0 to start motion and
                ' error handling
            BREAK
            CASE 2
                PRINT("CASE 2 move to P=-8000",#13)
                P=-8000
                GOSUB0
                'set position value
                'GO to SUBroutine C0 to start motion and
                ' error handling
            BREAK
            CASE 3
                PRINT("CASE 3 move to P=-10000",#13)
                P=-10000
                GOSUB0
                'set position value
                'GO to SUBroutine C0 to start motion and
                ' error handling
            BREAK
        ENDS
    LOOP
END

'infinite WHILE LOOP
'gate, waiting for PLC read ready signal
'reset the fault output if any
'if input A triggered, UAI will read 0,
' otherwise ab[0] is 1
'if input B triggered, UBI will read 0,
' otherwise ab[1] is 2
'summing up the binary values
'comparing each binary value with the
' SWITCH/CASE
' statement
'CASE 0 when B A triggered ( 0 0 )
'CASE 1 when B _ triggered ( 0 1 )
'CASE 2 when _ A triggered ( 1 0 )
'CASE 3 when _ _ triggered ( 0 0 )
'ENDS for closing SWITCH statement
'LOOP for closing WHILE statement
'END marks end of program
```

```

C0                                'Label for subroutine C0
UE=0                              'output high, trajectory started
G                                'start trajectory (motion)
TWAiT                             'wait until trajectory ends (motion stopped)
UE=1                              'reset signal to RESET MOTION (low) signal
to PLC
IF Be                              'checking excessive position error bit
    PRINT("excessive position error occured",#13)  'print to terminal window
    UF=0                                          'set fault signal (high)
ENDIF
IF Bp                              'checking RT limit bit
    PRINT("RT Limit reached",#13)                'print to terminal window
    UF=0                                          'set fault signal (high)
ENDIF
IF Bm                              'checking LT limit bit
    PRINT("LT Limit reached",#13)                'print to terminal window
    UF=0                                          'set fault signal (high)
ENDIF
IF Bh                              'checking over temperature bit
    PRINT("Over Temperature Occured",#13)        'print to terminal window
    UF=0                                          'set fault signal (high)
ENDIF
RETURN                            'RETURN to main program

```

You probably noticed that the motor is reading the signal low when high signal is being sent to the CBLIO4352DE cable. If you prefer the motor to read a high signal when high signal is being sent to the cable, you can mask the input value by using the following command:

```
a=UAI==0          `this sets a to 1 if UAI is true, which in this case if UAI is 0
                    `(low)
```

#### **I/O Commands:**

```
UAI      `initialize port A as input
UBI      `initialize port B as input
UCI      `initialize port C as input
UDI      `initialize port D as input
UCP      `initialize port C as Right Limit (Port C is right limit by default)
UDM      `initialize port D as Left Limit (Port D is left limit by default)
UGI      `initialize port G as input (port G can only be used as either
UGO      `initialize port G as outputinput or output)
UG=1     `set output G off (output line open)
UG=1     `set output G on (output line close)
UEO      `initialize port E as output
UE=1     `set output E off (output line open)
UE=0     `set output E on (output line close)
UFO      `initialize port F as output
UF=1     `set output F off (output line open)
UF=0     `set output F on (output line close)

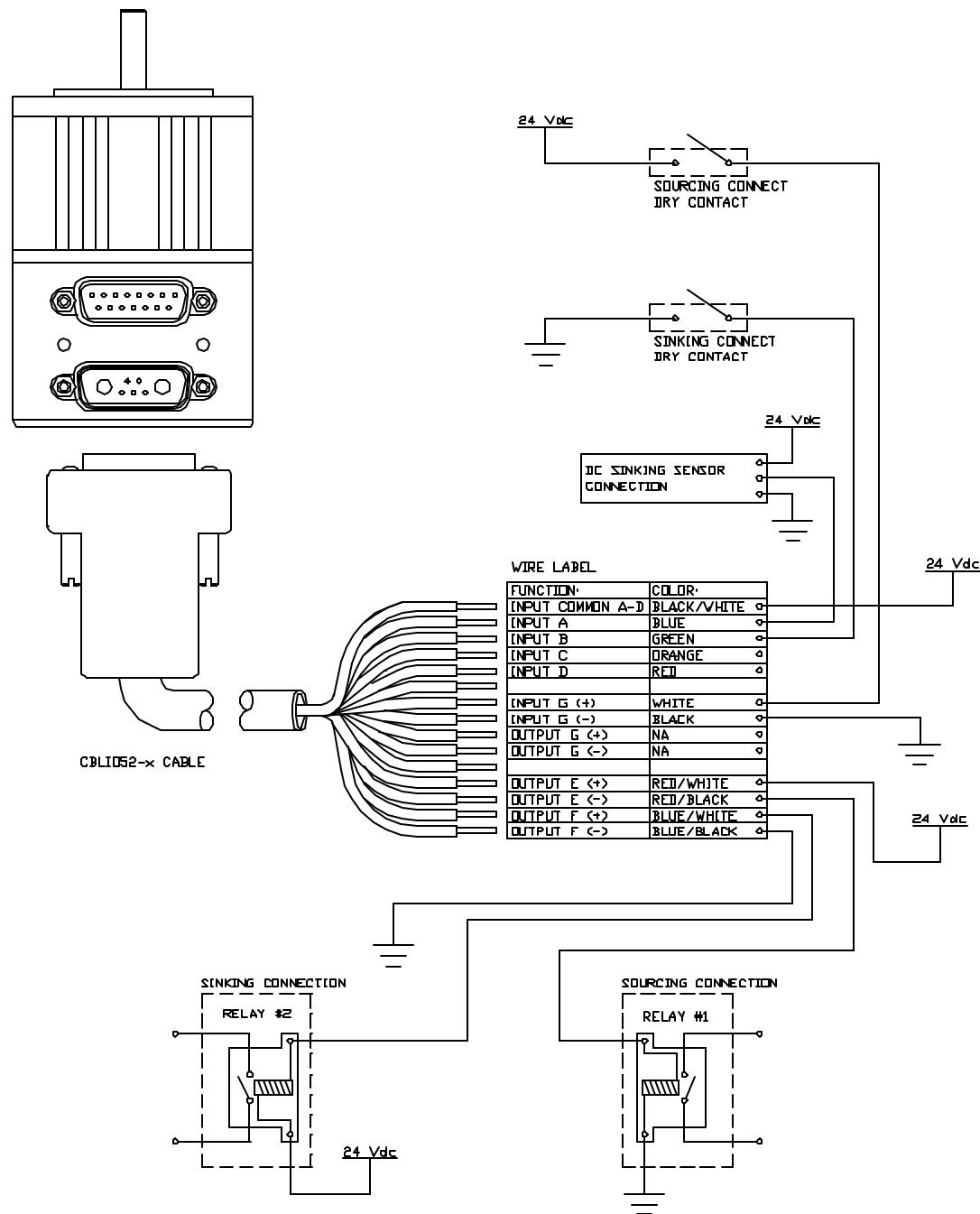
d=UCI    `store the input state value of port C into variable d

IF UAI   `using with IF statement, true => UAI is 1
ENDIF

IF UAI==0 `using with IF statement, true => UAI is 0
ENDIF
```

Another sample Wiring Diagram:

Using CBLIO52-x



For further details about I/O commands and program flows, please refer to the SmartMotor™ Users Guide.